WHAT IS CLAIMED IS:

1. A structure comprising:

   a. a first layer;

   b. a second layer adjacent to the first layer; and

   c. at least one z-pin embedded within the first and second layers to attach the first and second layers, the z-pin embedded therein defines a pull out force with respect to the first layer less than a pull out force with respect to the second layer, each z-pin having at least two radially extending flanges with at least one flange embedded within the first layer to greater depth compared to a depth to which the flange section is embedded within the second layer to compensate for the lower pull out force of the z-pin from the first layer compared to the pull out force of the z-pin from the second layer.

2. The structure of Claim 1 wherein each layer and z-pin defines a melting temperature, and the melting temperature of the z-pin is greater than the melting temperatures of the layers to allow the z-pin to be casted into the first and second layers.

3. The structure of Claim 1 wherein the first layer is manufactured from material selected from the group consisting of metal, ceramic, organic material, inorganic material, organic material with reinforcement fibers, organic material without reinforcement fibers, inorganic material with reinforcement fibers, inorganic material without reinforcement fibers, ceramic, and graphite epoxy.

4. The structure of Claim 1 wherein the second layer is manufactured from material selected from the group consisting of metal, ceramic, organic material, inorganic material, organic material with reinforcement fibers, organic material without reinforcement fibers, inorganic material with reinforcement fibers, inorganic material without reinforcement fibers, ceramic, and graphite epoxy.

5. The structure of Claim 1 wherein the first and second layers are manufactured from identical materials.

6. The structure of Claim 1 wherein the z-pins embedded within the first layer have a greater number of flange sections embedded therein compared to a number of flange sections embedded within the second layer to compensate for the lower pull out force of the z-pin from the first layer compared to the pull out force of the z-pin from the second layer.

7. The structure of Claim 1 wherein the z-pin has at least three radially extending flanges with a center flange having a cylindrical peripheral edge disposed at interface surfaces of the first and second layers to evenly distribute shearing forces created by the first and second layers on the center flange.

8. The structure of Claim 1 wherein an applied force is subjected on the structure and each z-pin defines a longitudinal axis aligned with the applied force to maximize the load carrying ability of the z-pin.

9. The structure of Claim 1 wherein the first layer, second layer and z-pin define respective densities, and the z-pin density is lower than the densities of the first and second layers to reduce a density of the structure with z-pins compared to a density of the structure without z-pins.

10. The structure of Claim 1 wherein the first layer, second layer and z-pin define respective hardnesses, and the z-pin hardness is lower than the hardness of the first and second layers to allow the z-pin to be removed from the first and second layers.

11. The structure of Claim 1 wherein the first layer, second layer and z-pin define respective coefficients of thermal expansion, and the coefficients of thermal expansion of the first layer, second layer and z-pin(s) may be equal to limit stresses between the z-pin and respective first and second layers.

12. The structure of Claim 1 further comprising a strip disposed between the first and second layers wherein the strip has embedded therein the z-pin flanges protruding from respective interface surfaces of the first and second layers.

13. A structure comprising:

a. a first layer defining an interface surface and having at least one depression, each depression configured as a female mating flange of a z-pin;

b. a second layer defining an interface surface with at least one nub being unitary with the second layer, each nub configured as at least one flange of the z-pin.

14. The structure of Claim 13 wherein each layer defines a melting temperature and the melting temperature of the second layer is greater than the melting temperature of the first layer to allow the nub to be casted within the depression of the first layer.

15. The structure of Claim 13 wherein the first layer is manufactured from material selected from the group consisting of metal, ceramic, organic material, inorganic material,

organic material with reinforcement fibers, organic material without reinforcement fibers, inorganic material with reinforcement fibers, inorganic material without reinforcement fibers, ceramic, and graphite epoxy.

16. The structure of Claim 13 wherein the second layer is manufactured from material selected from the group consisting of metal, ceramic, organic material, inorganic material, organic material with reinforcement fibers, organic material without reinforcement fibers, inorganic material with reinforcement fibers, inorganic material without reinforcement fibers, ceramic, and graphite epoxy.

17. The structure of Claim 13 wherein the first layer defines a first layer strength and the second layer defines a second layer strength stronger than the first layer strength, and a nub embedded within the first layer defines a pull out force as a function of a number of flanges embedded therein and the first layer strength, and the nub unitary with the second layer defines a pull out force as a function of the second layer strength, the nub having a sufficient number of flanges such that the pull out force of the nub embedded within the first layer is less than the pull out force of the nub for directing a failure mode of the structure to the first layer.

18. The structure of Claim 13 wherein the nub has a base flange configured as a cylindrical peripheral edge, and the base flange is disposed at interface surfaces of the first and second layers to evenly distribute shearing forces created by the first and second layers on the base flange.

19. The structure of Claim 13 wherein the first layer and second layer define respective coefficients of thermal expansion, and the coefficients of thermal expansions of the first and second layers are equal to limit stresses between the nub and the first layer.

20. A method for limiting delamination between attached first and second layers, the method comprising step a) of embedding a plurality of z-pins into an interface surface of the first layer, and embedding a plurality of z-pins into an interface surface of the second layer, each z-pin having at least two radially extending flanges, at least one flange section being embedded into respective first and second layers, and at least one flange sections protruding externally from the interface surfaces of respective first and second layers.

21. The method of Claim 20 further comprising step b) of inserting the flanges protruding externally from the interface surfaces of the first and second layers into the interface surfaces of the second and first layers, respectively.

22. The method of Claim 20 further comprising step b) of inserting the flanges protruding externally from the interface surfaces of the first and second layers into a strip.

23. The method of Claim 22 wherein the plurality of z-pins embedded into the first and second layers have z-pins embedded within the first layer which are offset with the z-pins embedded within the second layer.

24. A method of embedding z-pins within first and second layers, the method comprising:

a. forming female flange sections within the first and second layers with a channel connected to each of the female flange sections;
b. aligning the female flange sections of the first and second layers to each other;
c. filling liquid z-pin material into the aligned female flange sections of the first and second layers through the channel; and
d. solidifying the liquid z-pin material.